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EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/625,437

Applicant(s)

IATROU ET AL.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/23/03 7/7/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli ("Synchrotron light and imaging systems for medical radiology") in view of Urchuk et al. (US Patent 6148057).

Arfelli discloses a method comprising detecting components of plaque (page 15, col. 2, lines 9-11) using a multi-energy (page 15, col. 1) computer tomography (MECT) system (page 14, col. 1, "4. Computed Tomography").

However, Arfelli does not disclose generating a look-up table by using at least one phantom.

Urchuk et al. teaches generating a look-up table by using at least one phantom (col. 6, lines 39-50).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli with the generating of Urchuk et al., since one would be motivated to make such a modification to reduce artifacts in images (col. 6, lines 47-50) as shown by Urchuk et al.

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2. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Vinegar et al. (US Patent 4571491) and Tsutsui et al. (US Patent 5396530).

3. Regarding claim 5, Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose placing a phantom in a field for scanning and counting and distinguishing photons based on an energy threshold.

Vinegar et al. further teaches placing a phantom in a field for scanning (col. 1, lines 63-69). Tsutsui et al. teaches counting and distinguishing photons based on an energy threshold (Fig. 3 and Abstract).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the phantom of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the counting of Tsutsui et al., since one would be motivated to make such a modification to obtain an optimal picture of an object that may have a changing thickness (col. 3, lines 22-26) as implied from Tsutsui et al.

4. Regarding claim 6, Arfelli as modified above suggests a method as recited above.

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However, Arfelli does not disclose placing an object in a scanning field, scanning the object, and enabling reconstruction of images of a distribution of densities by reversely mapping projection data of the object to the densities of the selected basis materials, including at least one of iodine and water.

Vinegar et al. teaches placing an object in a scanning field, scanning the object (Abstract, lines 11-14), and enabling reconstruction of images of a distribution of densities (col. 1, lines 55-59) by reversely mapping projection data of the object to the densities of the selected basis materials (col. 2, lines 25-37), including at least one of iodine and water (Fig. 9, H₂O).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the scanning and reconstructing of Vinegar et al., since one would be motivated to make such a modification to simplify calculations for obtaining a density image (col. 1, lines 51-59) as implied from Vinegar et al.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Walters (US Patent 5115394).

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose performing additional scans of an object at different times and repeating detection.

Walters teaches performing additional scans of an object at different times and repeating detection (col. 13, lines 60-64).

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It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the additional scans of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Teirstein et al. (US Patent Application Publication 2001/0018042) and Walters.

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose administering a contrast agent in at least one of lipid-avid agents, plaque specific antigens, and plaque cells and repeating detection.

Teirstein et al. teaches administering a contrast agent in at least one of lipid-avid agents, plaque specific antigens, and plaque cells (Abstract, lines 3-10). Walters teaches repeating detection (col. 13, lines 60-64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the contrast agent of Teirstein et al., since one would be motivated to make such a modification to better study plaque inexpensively and non-invasively (paragraph 20, last six lines) as implied from Teirstein et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the repetition

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of detection of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Falotico et al. (US Patent Application Publication 2003/0060877) and Walters.

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose administering a contrast agent in an inflamed plaque and repeating detection.

Falotico et al. teaches administering a contrast agent in an inflamed plaque (paragraph 26). Walters teaches repeating detection (col. 13, lines 60-64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the contrast agent of Falotico et al., since one would be motivated to make such a modification to make it easier to identify vulnerable plaque (paragraph 26) as shown by Falotico et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the repetition of detection of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Arnold (US Patent 5335260).

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Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose quantifying components.

Arnold teaches quantifying components (Title).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the quantifying of Arnold, since one would be motivated to make such a modification to make more quantitative and accurate assessments of medical conditions instead of just subjective opinions.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli, Urchuk et al., and Arnold as applied to claim 10 above, and further in view of Kaufman et al. (US Patent Application Publication 2003/0095693).

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose calculating composition distributions or calculating total plaque burden.

Arnold further teaches calculating composition distributions (Title, and col. 2, lines 48-54). Kaufman et al. teaches calculating total plaque burden (paragraph 4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Arfelli as modified above with the calculating of Arnold, since one would be motivated to make such a modification to make more quantitative and accurate assessments of medical conditions instead of just subjective opinions.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the calculating

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of Kaufman et al., since one would be motivated to make such a modification to make it easier to assess risk for heart disease (paragraph 4) as implied from Kaufman et al.

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Charles, Jr. et al. (US Patent 6816564) and Fox et al. (US Patent 5668846).

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose displaying at least one of a 2D and a 3D image for viewing.

Charles, Jr. et al. teaches displaying at least one of a 2D and a 3D image (Fig. 4C-4E). Fox et al. teaches viewing a 3D image from a viewpoint (col. 7, lines 13-20).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the display of a 2D or 3D image of Charles, Jr. et al., since one would be motivated to make such a modification to better and more quickly see what is inside the object of inspection.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the viewing of a 3D image of Fox et al., since one would be motivated to make such a modification to better analyze image data during an interventional procedure more quickly (col. 2, lines 14-21) as implied from Fox et al.

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11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli and Urchuk et al. as applied to claim 1 above, and further in view of Vaillant et al. (EP 1087339), Regulla et al. (US Patent 6001054), Gayer et al. (US Patent 6094467), and Walters.

Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose imaging restenosis with at least one of metal stents and valves, removing beam-hardening artifacts, and repeating detection.

Vaillant et al. teaches imaging restenosis with stents (paragraphs 3 and 5). Regulla et al. teaches metal stents (col. 4, lines 30-35). Gayer et al. teaches removing artifacts, which would necessarily be beam-hardening due to the metallic nature of the high attenuation objects (Abstract). Walters teaches repeating detection (col. 13, lines 60-64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the imaging of Vaillant et al., since one would be motivated to make such a modification to better make sure that the stent is in the right place (paragraph 3) as implied from Vaillant et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the metal stents of Regulla et al., since one would be motivated to make such a modification to have a stronger stent to keep adequate flow of blood therethrough (col. 4, lines 30-36) as implied from Regulla et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the removal of

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artifacts of Gayer et al., since one would be motivated to make such a modification to improve visual definition (Abstract) as shown by Gayer et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the repeating of detection of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli in view of Urchuk et al. and Vinegar et al.

For purposes of being concise Arfelli in view of Urchuk et al. suggests a method as recited above.

However, Arfelli does not disclose generating information regarding projection data of phantoms and obtaining components from that information.

Vinegar et al. teaches generating information regarding projection data of phantoms (Fig. 7) and obtaining components from that information (col. 1, lines 55-59).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the generating and obtaining of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen (US Patent 5218533) in view of Arfelli and Urchuk et al.

Schanen discloses a system comprising at least one radiation source to transmit x-rays intersecting an object (Fig. 1, #10 and 14), at least one detector to detect the x-rays (Fig 1, #18), a controller coupled to the detector (Fig. 1, #28), and a computer to detector components (Fig. 1, #36).

However, Schanen does not disclose detecting plaque using multi-energy imaging, or generating a look-up table by using at least one phantom.

Arfelli teaches detecting plaque using multi-energy imaging (page 15, col. 2, lines 9-11). Urchuk et al. teaches generating a look-up table by using at least one phantom (col. 6, lines 39-50).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen with the multi-energy imaging of plaque of Arfelli, since one would be motivated to make such a modification to more easily differentiate different parts (page 15, first three paragraphs) as implied from Arfelli.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen with the generating of Urchuk et al., since one would be motivated to make such a modification to reduce artifacts in images (col. 6, lines 47-50) as shown by Urchuk et al.

14. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen, Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Walters and Aradate et al. (US Patent 2002/0131544).

Schanen as modified above suggests a system as recited above.

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However, Schanen does not disclose performing additional scans of an object at different times and repeating detection with computer instructions.

Walters teaches performing additional scans of an object at different times and repeating detection (col. 13, lines 60-64). Aradate et al. teaches computer instructions (paragraph 65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the additional scans of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the computer instructions of Aradate et al., since one would be motivated to make such a modification to carry out processes faster.

15. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen, Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Teirstein et al., Walters, and Aradate et al.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose administering a contrast agent in at least one of lipid-avid agents, plaque specific antigens, and plaque cells and repeating detection with computer instructions.

Teirstein et al. teaches administering a contrast agent in at least one of lipid-avid agents, plaque specific antigens, and plaque cells (Abstract, lines 3-10). Walters teaches performing

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additional scans of an object at different times and repeating detection (col. 13, lines 60-64).

Aradate et al. teaches computer instructions (paragraph 65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the contrast agent of Teirstein et al., since one would be motivated to make such a modification to better study plaque inexpensively and non-invasively (paragraph 20, last six lines) as implied from Teirstein et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the additional scans of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the computer instructions of Aradate et al., since one would be motivated to make such a modification to carry out processes faster.

16. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen, Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Falotico et al., Walters, and Aradate et al.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose administering a contrast agent in an inflamed plaque and repeating detection with computer instructions.

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Falotico et al. teaches administering a contrast agent in an inflamed plaque (paragraph 26). Walters teaches performing additional scans of an object at different times and repeating detection (col. 13, lines 60-64). Aradate et al. teaches computer instructions (paragraph 65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the contrast agent of Falotico et al., since one would be motivated to make such a modification to make it easier to identify vulnerable plaque (paragraph 26) as shown by Falotico et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the additional scans of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the computer instructions of Aradate et al., since one would be motivated to make such a modification to carry out processes faster.

17. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen, Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Arnold.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose quantifying components.

Arnold teaches quantifying components (Title).

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It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the quantifying of Arnold, since one would be motivated to make such a modification to make more quantitative and accurate assessments of medical conditions instead of just subjective opinions.

18. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen, Arfelli, Urchuk et al., and Arnold as applied to claim 22 above, and further in view of Kaufman et al.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose calculating composition distributions or calculating total plaque burden.

Arnold further teaches calculating composition distributions (Title, and col. 2, lines 48-54). Kaufman et al. teaches calculating total plaque burden (paragraph 4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the system of Schanen as modified above with the calculating of Arnold, since one would be motivated to make such a modification to make more quantitative and accurate assessments of medical conditions instead of just subjective opinions.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the calculating of Kaufman et al., since one would be motivated to make such a modification to make it easier to assess risk for heart disease (paragraph 4) as implied from Kaufman et al.

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19. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen , Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Charles, Jr. et al., Fox et al., and Aradate et al.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose displaying at least one of a 2D and a 3D image for viewing with computer instructions.

Charles, Jr. et al. teaches displaying at least one of a 2D and a 3D image (Fig. 4C-4E). Fox et al. teaches viewing a 3D image from a viewpoint (col. 7, lines 13-20). Aradate et al. teaches computer instructions (paragraph 65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the display of a 2D or 3D image of Charles, Jr. et al., since one would be motivated to make such a modification to better and more quickly see what is inside the object of inspection.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the viewing of a 3D image of Fox et al., since one would be motivated to make such a modification to better analyze image data during an interventional procedure more quickly (col. 2, lines 14-21) as implied from Fox et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the computer instructions of Aradate et al., since one would be motivated to make such a modification to carry out processes faster.

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20. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen , Arfelli, and Urchuk et al. as applied to claim 15 above, and further in view of Vaillant et al., Regulla et al., Gayer et al., and Walters.

Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose imaging restenosis with at least one of metal stents and valves, removing beam-hardening artifacts, and repeating detection.

Vaillant et al. teaches imaging restenosis with stents (paragraphs 3 and 5). Regulla et al. teaches metal stents (col. 4, lines 30-35). Gayer et al. teaches removing artifacts, which would necessarily be beam-hardening due to the metallic nature of the high attenuation objects (Abstract). Walters teaches repeating detection (col. 13, lines 60-64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the imaging of Vaillant et al., since one would be motivated to make such a modification to better make sure that the stent is in the right place (paragraph 3) as implied from Vaillant et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the metal stents of Regulla et al., since one would be motivated to make such a modification to have a stronger stent to keep adequate flow of blood therethrough (col. 4, lines 30-36) as implied from Regulla et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the removal of

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artifacts of Gayer et al., since one would be motivated to make such a modification to improve visual definition (Abstract) as shown by Gayer et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the repeating of detection of Walters, since one would be motivated to make such a modification to better distinguish between different materials (col. 1, lines 13-14 and 55-69) as shown by Walters.

21. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli in view of Zmora (US Patent 6028909) and Ito et al. (US Patent 5122664).

For purposes of being concise, Arfelli discloses an apparatus as recited above.

However, Arfelli does not disclose a computer readable medium or computer encoded with a program, or generating, by using at least one phantom, a look-up table that maps different densities of a selected basis material of the phantom to projection data for different energy spectra.

Zmora teaches a computer readable medium or computer encoded with a program (col. 8, lines 24-30). Ito teaches generating, by using at least one phantom (fig. 2), a look-up table (col. 12, line 52) that maps different densities (fig. 2, #5a to 5f) of a selected basis material of the phantom (fig. 2) to projection data for different energy spectra (fig. 6, S₁).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the device of Arfelli with the computer readable medium or computer of Zmora, since one would be motivated to make such a modification to process information faster or make it easier to send the program to remote locations.

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It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the device of Arfelli with the phantom of Ito et al., since one would be motivated to make such a modification to more easily quantitatively analyze an object (col. 4, lines 36-40) as implied from Ito et al.

22. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arfelli in view of Vinegar et al. (US Patent 4571491), Lazos et al. ("A Software Data Generator for Radiographic Imaging Investigations") and Adriaansz (US Patent 6574302).

23. Regarding claims 1 and 2, Arfelli discloses a method comprising detecting components of plaque (page 15, col. 2, lines 9-11) using a multi-energy (page 15, col. 1) computer tomography (MECT) system (page 14, col. 1, "4. Computed Tomography").

However, Arfelli does not disclose generating a look-up table using at least one simulated phantom, wherein the look-up table maps different densities of a selected basis material of the phantom to projection data for different energy spectra, and obtaining components from that information.

Vinegar et al. teaches using at least one phantom to map different densities (Fig. 7) of a selected basis material of the phantom to projection data for different energy spectra (Fig. 9, 60 and 88 keV), and obtaining components from that information (col. 1, lines 55-59). Lazos et al. teaches a simulated phantom (page 76, section I, paragraph 2). Adriaansz teaches a look-up table (claim 4).

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It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli with the phantom of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli with the simulated phantom of Lazos et al., since one would be motivated to make such a modification for cheaper costs and flexibility (page 76, section I, paragraph 1) as shown by Lazos et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli with the look-up table of Adriaansz, since one would be motivated to make such a modification to organize data better for easier retrieval.

24. Regarding claim 3, Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose placing the phantom in a scanning field and scanning the phantom at first and second energy spectra.

Vinegar et al. teaches placing the phantom (Fig. 7) in a scanning field and scanning the phantom at first and second energy spectra (Fig. 9, 60 and 88 keV).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the phantom of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

25. Regarding claim 4, Arfelli as modified above suggests a method as recited above.

However, Arfelli does not disclose placing an object in a scanning field, scanning the object at first and second spectra, and enabling reconstruction of images of a distribution of densities by reversely mapping projection data of the object to the densities of the selected basis materials, including at least one of iodine and water.

Vinegar et al. teaches placing an object in a scanning field, scanning the object at first and second spectra (Abstract, lines 11-14), and enabling reconstruction of images of a distribution of densities (col. 1, lines 55-59) by reversely mapping projection data of the object to the densities of the selected basis materials (col. 2, lines 25-37), including at least one of iodine and water (Fig. 9, H₂O).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Arfelli as modified above with the scanning and reconstructing of Vinegar et al., since one would be motivated to make such a modification to simplify calculations for obtaining a density image (col. 1, lines 51-59) as implied from Vinegar et al.

26. Claim 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen (US Patent 5218533) in view of Arfelli.

27. Regarding claims 15 and 16, Schanen discloses a system comprising at least one radiation source to transmit x-rays intersecting an object (Fig. 1, #10 and 14), at least one detector to

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detect the x-rays (Fig 1, #18), a controller coupled to the detector (Fig. 1, #28), and a computer to detector components (Fig. 1, #36).

However, Schanen does not disclose detecting plaque using multi-energy imaging, generating a look-up table using at least one simulated phantom, wherein the look-up table maps different densities of a selected basis material of the phantom to projection data for different energy spectra, and obtaining components from that information.

Arfelli teaches detecting plaque using multi-energy imaging (page 15, col. 2, lines 9-11). Vinegar et al. teaches using at least one phantom to map different densities (Fig. 7) of a selected basis material of the phantom to projection data for different energy spectra (Fig. 9, 60 and 88 keV), and obtaining components from that information (col. 1, lines 55-59). Lazos et al. teaches a simulated phantom (page 76, section I, paragraph 2). Adriaansz teaches a look-up table (claim 4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen with the multi-energy imaging of plaque of Arfelli, since one would be motivated to make such a modification to more easily differentiate different parts (page 15, first three paragraphs) as implied from Arfelli.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the phantom of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the simulated

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phantom of Lazos et al., since one would be motivated to make such a modification for cheaper costs and flexibility (page 76, section I, paragraph 1) as shown by Lazos et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the look-up table of Adriaansz, since one would be motivated to make such a modification to organize data better for easier retrieval.

28. Regarding claim 17, Schanen as modified above suggests a system as recited above.

However, Schanen does not disclose placing a simulated phantom in a scanning field and scanning the phantom at first and second energy spectra.

Vinegar et al. teaches placing the phantom (Fig. 7) in a scanning field and scanning the phantom at first and second energy spectra (Fig. 9, 60 and 88 keV). Lazos et al. teaches a simulated phantom (page 76, section I, paragraph 2).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the phantom of Vinegar et al., since one would be motivated to make such a modification to simplify calculations (col. 1, lines 51-54) as implied from Vinegar et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the simulated phantom of Lazos et al., since one would be motivated to make such a modification for cheaper costs and flexibility (page 76, section I, paragraph 1) as shown by Lazos et al.

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29. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schanen in view of Arfelli, Vinegar et al., Lazos et al., and Adriaansz as applied to claim 17 above, and further in view of Aradate et al. (US Patent 2002/0131544).

Schanen as modified above suggests a system as recited above.

However, Arfelli does not disclose placing an object in a scanning field, scanning the object at first and second spectra, and enabling reconstruction of images of a distribution of densities by reversely mapping projection data of the object to the densities of the selected basis materials, including at least one of iodine and water with computer instructions.

Vinegar et al. teaches placing an object in a scanning field, scanning the object at first and second spectra (Abstract, lines 11-14), and enabling reconstruction of images of a distribution of densities (col. 1, lines 55-59) by reversely mapping projection data of the object to the densities of the selected basis materials (col. 2, lines 25-37), including at least one of iodine and water (Fig. 9, H₂O). Aradate et al. teaches computer instructions (paragraph 65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the scanning and reconstructing of Vinegar et al., since one would be motivated to make such a modification to simplify calculations for obtaining a density image (col. 1, lines 51-59) as implied from Vinegar et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Schanen as modified above with the computer instructions of Aradate et al., since one would be motivated to make such a modification to carry out processes faster.

Response to Arguments

30. Applicant's arguments with respect to claims 1, 5-15, and 19-27 have been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments filed 4/25/05 have been fully considered but they are not persuasive.

31. Applicants argue that none of Schanen, Arfelli, Vinegar et al., Lazos et al., and Adriaansz, considered alone or in combination, describe or suggest generating a look-up table by using at least one phantom. The Examiner disagrees. Adriaansz teaches generating a look-up table (claim 4) by using at least one phantom (fig. 2a and col. 4, lines 50-60). Therefore, Applicants' arguments are not persuasive, and the claims remain rejected.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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